L	Hits	Search Text	DB	Time stamp
Number				
1	3553	((ARC or antireflective or BARC) with	USPAT;	2004/10/05
		(silicon or polysilicon))	US-PGPUB	13:52
2	. 1747	(((ARC or antireflective or BARC) with	USPAT;	2004/10/05
		(silicon or polysilicon))) and (resist or	US-PGPUB	13:53
	1	photoresist)		
3	255	((((ARC or antireflective or BARC) with	USPAT;	2004/10/05
		(silicon or polysilicon))) and (resist or	US-PGPUB	13:53
		photoresist)) and ((remove or removing)		
		with plasma)	1	
4	104	((((ARC or antireflective or BARC) with	USPAT;	2004/10/05
		(silicon or polysilicon))) and (resist or	US-PGPUB	13:53
		photoresist)) and ((remove or removing)		
		with plasma with (resist or photoresist))		
5	67	(((((ARC or antireflective or BARC) with	USPAT;	2004/10/05
		(silicon or polysilicon))) and (resist or	US-PGPUB	13:54
		photoresist)) and ((remove or removing)		
		with plasma with (resist or	1	
		photoresist))) and @ad<20020219		

US-PAT-NO: 6191046

DOCUMENT-IDENTIFIER: US 6191046 B1

TITLE: Deposition of an oxide layer to

facilitate photoresist

rework on polygate layer

----- KWIC -----

Brief Summary Text - BSTX (7):

Reworking or re-patterning a photoresist of an IC device is economically

desirable, as compared to scrapping the wafer, when there is at least one

correctly constructed lower layer (e.g., a silicon wafer) already formed

beneath a photoresist layer. However, the process of stripping the photoresist

pattern layer or portion thereof may result in damage to or change a top

monolayer of oxide portion of an anti-reflective coating (ARC) which lies on

top of a **polysilicon** layer. A change in the monolayer may result in exposure

dose change as well as interaction of the deep UV photoresist with the ARC material.

Brief Summary Text - BSTX (8):

More particularly, a top monolayer of a **silicon** oxy-nitride **ARC** is converted

into an oxide by N.sub.2 O plasma to prevent nitrogen contact with the

photoresist layer formed over the ARC. Nitrogen contact with the photoresist

may result in undesirable footing problems (non-uniform structure). Thus, the

oxide monolayer serves as a barrier between the photoresist and nitrogen

portion of the ARC. Such a monolayer works fine during an intial photoresist

application and photolithographic process. However, if the

photoresist needs
to be reworked the plasma and chemical process employed in
the rework to strip
the photoresist may result in removal of the oxide
monolayer. Consequently,
nitrogen bonds of the silicon oxy-nitride may react with a
newly applied
chemically amplified deep UV photoresist resulting in
footing problems in the
new photoresist layer.

Detailed Description Text - DETX (6): Any suitable technique for depositing the oxide layer 26 may be employed such as LPCVD, PECVD, atmospheric pressure chemical vapor deposition (APCVD), or high density plasma chemical vapor deposition (HDPCVD) techniques such as electron cyclotron resonance (ECR), inductor coupled plasma (ICP), transformer coupled plasma (TCP) and helicon plasma. The oxide material is deposited over the ARC 25 in order to form the oxide layer 26 thereon. The oxide layer 26 forms a protective coating or seal over both the ARC 25 and the underlying polysilicon layer 24. As is further discussed below, the oxide layer 26 serves

oxide layer 26 serves to protect the <u>ARC</u> 25 and the <u>polysilicon</u> layer 24 from the detrimental effects which may be experienced during rework of an overlying photoresist layer.

Detailed Description Text - DETX (15):

A circuit image of any desired pattern is next formed within the resist layer by exposure of the resist layer to radiation through an appropriate photolithographic mask or by controlled laser, ion beam or electron beam energy sources, followed by suitable development to remove the exposed or unexposed areas of the resist, depending on the resist chemistry. The development step exposes that portion of the oxide layer 26, the ARC 25 and the polysilicon

layer 24 which are to be etched away during later processing stages, while the remaining portions of the surface 26 continue to be masked by the resist.

Positive resist materials (e.g., novolac resin types) are preferred for this invention since they may be developed using aqueous alkaline developer materials such as alkali or alkaline earth metal hydroxide or metal-silicate aqueous solutions (e.g., 0.2 N KOH).

Detailed Description Text - DETX (19): The processes available for reworking an IC depend in large part upon the composition of the incorrectly patterned or defective layer which is to be For example, if photoresist layer 28 is composed removed. of a novolac resin type photoresist material, a defective or incorrectly patterned photoresist layer 28b can be removed by ACT-935, followed by washing with water and then a plasma strip to completely remove the defective or incorrectly photoresist layer 28b. As can be seen in FIG. 1c, the removal portion of the reworking process is graphically illustrated by arrows 32.

Detailed Description Text - DETX (20): As discussed above, during rework a conventional oxide monolayer of an ARC would also be stripped or partially stripped during rework thus exposing portions of the silicon oxy-nitride ARC to a photoresist to be newly applied. The nitrogen of the ARC may creating undesirable footing problems in the new photoresist. The present invention mitigates such problems by employment of the oxide layer 26 formed in the manner discussed above. The oxide layer 26 acts as a protective layer to serve as a barrier to nitrogen contamination of the photoresist 28 by the ARC 25. The oxide layer 26 has a thickness which

affords for sufficient oxide layer 26 to remain after a photoresist stripping process such that the remaining oxide layer 26 still prevents nitrogen contamination of the newly applied photoresist layer. As a result an increase in production yield is realized due to the ability of IC devices with incorrectly patterned photoresists to be reworked.

Claims Text - CLTX (16):

9. The method of claim 7, wherein the step of <u>removing</u> the patterned photoresist layer and a portion of the oxide layer is accomplished by sequentially using ACT-935, water and **plasma** stripping.